Inefficiencies in Search Models: The Case for Islamic Finance

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INEFFICIENCIES IN SEARCH MODELS: THE CASE FOR ISLAMIC FINANCE

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ABSTRACT

In economies without friction, where money as a means of exchange has no role, the existence of the rate of interest would have no efficiency consequence. Once a friction that justifies the use of a means of exchange is introduced in the macroeconomic model, the inefficiencies resulting from the presence of the rate of interest become exposed.

In search models, where money has a raison d'être, the use of money in trade when accompanied with conventional finance, is associated with two important inefficiencies. The first is the Friedman-Samuelson inefficiency. The payment of a positive (interest) rate of return on money, with guaranteed principle and return, motivates agents to economize on the use of cash in transactions. This reduces the volume of transactions below optimum. The substitution of real resources for cash would further reduce output. The second is Hosios inefficiency which results from the existence of externalities in search activities by agents. Failure to internalize such externalities would also reduce the volume of transactions below optimum.

The paper argues that the switch to Islamic finance removes both inefficiencies.

CONTENTS

INTRODUCTION

Conventional economics as stated by the classics and restated by neoclassics envisages a perfect model free from inefficiencies and instability. The history of the market economy, measured by this quality has been less than satisfactory. According to Wikipedia (2017), 24 recessions took place between the Free Banking Era to the Great Depression and 14 crises after the Great Depression and until the Great recession.

Repetitive crises do not speak well for the classical and neoclassical doctrine. The faults of the theory served to coverup some basic problem with the market economic system and served to support the belief of those who uphold the superiority of the system. This factor is that neither the classical nor the neoclassical model allow for an incentive to hold money as a means of exchange. Both models assume perfect markets that exclude any friction which would justify the use of a medium of exchange. The nascent brand of search model, which provide such justification can be used to expose serious inefficiencies that would serve as a strong support to Islamic finance as both an alternative or a part of a reform plan.

THE 1ST SHOCK TO THE DOCTRINE: THE GREAT DEPRESSION

The great depression gave prominence to the Keynesian revolution which helped in advancing economics to become matured as a social science while being dominated by two schools of thought that competed for both intellectual as well as political influence, namely the Keynesian and the monetarist schools. Economists, considered the rate of interest as a price. Specifically, it is the relative price of present money to future money. You could rarely find an economist who would call for a zero price of anything, as prices serve as important tools in resource allocation and a coordination force among decision makers in the economy.

The theory of value has been developed in a world without money. In order to construct an economic model where money can justifiably serve as a means of exchange, i.e., a *monetary model*, economists discovered that they must add a friction that becomes the *raison d'être* of money. Several models with friction sprang out for this purpose[1].

The amazing thing is that the neoclassical and Keynesian model, being devoid of frictions that justify the use of a medium of exchange, has hidden the inefficiencies related to the role of interest in the economy. Once a justifiable friction, like search cost is introduced, the nakedness of the emperor becomes apparent.

HOW MONEY CAN BE INTRODUCED: BUILDING A SEARCH MODEL

Barter exchange is associated with inefficiencies. The lack of double coincidence of wants, even with perfect divisibility of commodities would leave many exchanges inexecutable. The resulting number of exchanges under barter would be suboptimal. In order to solve this problem, the Walrasian general equilibrium model introduces an auctioneer within the arrangement of centralized exchange in order to reach equilibrium. All traders (buyers and sellers) in the economy meet in one place. The auctioneer cries a list of prices of all commodities and takes offers of sale and purchase. He allows trading only when quantity demanded is equal to

[1] (Kiyotaki and Wright, (1991, 1993) and Kocherlakota (1998)

quantity supplied at the cried price. Traders would try to profit from price difference by *arbitrage*. They adjust their sale and purchase offers. Gradually equilibrium is reached through *tatonnement*. Such arrangement to reach general equilibrium, while conceptually wonderful, is absolutely impractical. The introduction of money would be a good substitute. This would require a different setup where money use can be justified. Unfortunately, the classical perfect model has no place for money as a medium of exchange.

To carry on the intellectual exercise further, let us assume that we no longer have an auctioneer, and no longer have a place in which all traders gather. Centralized exchange would not be possible. The process of arbitrage would be interrupted, and degenerate the exchange economy back into barter. The Walrasian numéraire will be exposed as incapable of being used as a medium of exchange. We must therefore do away with perfect exchange model and move forward to a model with some friction that justifies the use of a medium of exchange. The best alternative to introduce transactions costs that results due to structural reasons would be to use search models. This would give a strong justification for the use of money, and allow for a step forward towards consistent monetary economics.

Search models use frictions in the goods market to justify the use of a medium of exchange. Intuitively, the mere introduction of transactions costs, by assuming costly information and consequently, costly search for prices would be sufficient. However, economists as usual would want to imbed into the model something that results in costly information. That gave rise to search models.

The nascent search literature contains many different variants of a basic search model, each designed to deal with some application[2]. On the one hand, Reinganum (1979) introduces identical buyers while firms have different constant marginal costs. The equilibrium distribution of prices is attached to firms' costs. On the other hand, Rob (1985) introduces identical firms while buyers facing different search costs. Carlson and McAfee (1983) admits buyers' heterogeneous search costs and firms' constant marginal costs, only under assumptions to enable the solution of his model. B´enabou (1993) extends Carlson and McAfee (1983) model by combining the Reinganum and Rob models. Rauh (2007) extends B´enabou (1993) and prove existence of equilibrium in pure strategies under two distinct sets of assumptions. The first standard set directly generalize B´enabou model. The second general set allows for heterogeneity in buyers' search costs, demand functions and firms' cost functions

Another type of search models pioneered by Kiyotaki and Wright (1991, 1993), frictions are introduced through random bilateral matching and private trading histories, in the context of decentralized exchanges, (Kocherlakota, 1998). Without money, it is difficult for agents conduct socially desirable trades. Money becomes necessary to facilitate trade and increase social welfare. Agent use money instead of barter to trade efficiently as any two traders require only single coincidence of wants.

The construction of search models is a step towards establishing general equilibrium in a macroeconomic model that is not marred with perfect competition. Curiously enough, such models expose serious inefficiencies of the conventional economy. Despite the use of money, general equilibrium remains inefficient, albeit not as inefficient as

[2] The paper focuses on price search models. There is another class of labor search and survival models reviewed by Canals et al (2002).

the barter exchange model.

OPTIMALITY IN SEARCH MODELS

We can therefore use the search model for two purposes. The first is to see if the introduction of money in the economy in the face of costly information, while keeping the classical loan contract, overcomes the hurdles of barter while ushering the economy to efficient frontiers.

The second, is to check whether the removal of the classical loan contract and its substitution by the Islamic investment and finance contracts, or Islamic finance properly implemented would remove any remaining inefficiencies from the search model.

INEFFICIENCIES SURFACING IN THE SEARCH MODEL

Any two trading agents have either asymmetric bargaining powers or asymmetric demands for the goods each wishes to exchange with the other.

The lack of double coincidence of wants can be manifested in the form of asymmetric demands, but not necessary to justify the use of money in a search model, Engineer and Shi (1998, 2001) and Berentsen and Rocheteau (2001). In other words, barter exchange would still work without money if it suffers from asymmetric demand, if asymmetric matches can be reached.

Money facilitates exchanges in asymmetric matches. The use of money can be justified, based on facilitating exchange and improving social welfare where the two agents have *only single coincidence of wants*. The introduction of money goes a long way in rehabilitating barter exchange and increasing the scope of exchange and division of labor.

However, monetary equilibrium in such models suffers from two types of inefficiency. First, because agents ignore the externalities, as their search improves their partners' matching probabilities, the number of trades is inefficient. This is called the Hosios type inefficiency that results in a search economy (Hosios, 1990). Second, because buyers in each match are constrained by the available real money balance, the quantity of goods in each trade is inefficient. This is called the Friedman-Samuelson inefficiency (Samuelson, 1958; Friedman, 1969) that results from a positive monetary rate of interest.

I. THE HOSIOS TYPE INEFFICIENCY

In a monetary economy, where money is actually and justifiably used, information would be costly and searching by economic agents would be a necessary outcome. Buyers and sellers would search for the best match. Understandably, search efforts would be significant for large-value items, bought individually or in a bunch, e.g., weekly, monthly, or seasonal shopping as well as when durables are purchased by households and factors of production are purchased by firms. In such cases, the resources spent on search would be significant and may affect the research outcome.

Apparently, research models implicitly assume divisibility across the board, which makes this factor insignificant. Naturally, this occurs in exchanges involving large quantities on commodities to be traded in bulk, durables, or factors of production. In such cases, agents would spend proportionately higher amounts on price searching. Spending on search for any item would not be uniform for all traders. Those who spend relatively more, gain more information.

Gains from search would be unevenly distributed between trading partners. Those who spend more resources in search and gain more information about the available prices and counterparties, have no way of internalizing such externality through selling some of the information they collected to some trading agents.

Knowing that the surplus information, once obtained by a trader is not sellable, i.e., it cannot be internalized, traders will curtail the number of transactions in high-value items. In other words, the volume of transactions would be below optimal

II. THE FRIEDMAN-SAMUELSON INEFFICIENCY

The Friedman-Samuelson inefficiency related to positive interest rate has been discovered earlier before the introduction of search models. Monetary economists found that a zero-nominal interest rate is a necessary condition for the optimal allocation of resources (Samuelson, 1958; Friedman, 1969). The reason is simple. In a world with fiat money, adding one marginal unit of real balances costs no real resources to the community. Therefore, imposing a positive price on the use of money would lead traders to economize on the use of money in transactions, in their pursuit to minimize their transactions costs. They would therefore use some real resources instead of money in transactions. However, when the rate of interest is zero, traders will have no incentive to substitute real resources for money. Additional real resources can therefore be released for consumption and investment.

When this matter was investigated within general equilibrium models, it was found that a zero interest rate is both a necessary and sufficient condition for allocative efficiency (Cole & Kocherlakota, 1998; Chari & Kehoe 1996; Wilson, 1979). Though these theoretical results are dependent on some simplifying assumptions, they have been found to be robust in a variety of models (Correia and Teles, 1997).

Milton Friedman suggests steadily contracting the money supply at a rate equal to the representative household time preference (Friedman, 1969, p. 34 quoted by Ireland, 2000).

Accordingly, economists continued to search for the set of monetary policies that would bring the rate of interest to zero, in order to reach an optimal allocation of resources. They depended on the relationship known as the *Fisher hypothesis*, which decomposes (in the terms used by St. Amant, 1996) the nominal interest rate as the sum of the expected inflation rate and ex ante real interest rate:

Therefore, it appears that deflating the economy at a rate equal to the real rate of interest would automatically set the (nominal) rate of interest to zero. This would be the optimal monetary policy rule that insures that financial resources are allocated efficiently.

Such policy rule clearly implies that the optimal rate of inflation is negative. However, Central bankers would never seriously advocate a long-run policy of deflation (Wolman, 1997)[3].

Deflating the economy would bring with it several problems both conceptually and practically. Conceptually, economists would naturally worry about the existence of a liquidity trap when the rate of interest is zero (Uhlig, Harald, 2000). Another conceptual problem is what happens with the volume of money supply that is shrinking over time.

[3] Economists also recommended the application of 100 percent required reserve ratio. However, policy-makers have not been impressed, despite the obvious benefits.

Practicalities mandate that such volume would be (numerically) sufficient to carry out transactions at the current price level. Economists as they often do, assume divisibility. Therefore, money can be used in infinitesimally small denominations, so that a dollar can be broken into cents and cents can be broken into smaller parts and so on. This may go on and on until money vanishes.

Several economists point out that deflationary policies have to be exercised only asymptotically in order to apply the Friedman's Rule (Cole and Kocherlakota, 1998). Asymptotic behavior of deflation is a claim that can conflict with the rule that it should be equal to the real rate of return. It is not perceivable in a growing economy to have a real rate of return that behaves asymptotically.

Some claim that even if the asymptotic conditions are not fulfilled, short term constraints on monetary policy can do the job (Ireland, 2000). Others may worry that when the rate of interest becomes very low, monetary authorities have less leeway with adjusting it downwards in the face of recession. Meanwhile, some economists respond by proposing alternative ways to overcome the zero-bound on interest rate policy (Goodfriend, 2000). Another conceptual problem is that deflation has efficiency problems parallel to those of inflation, even at very low interest rates (Lucas, 1994). However, the welfare cost of implementing a zero rate of interest has been found negligible (Wolman, 1997).

Many economists appear to dismiss the practical and conceptual problems involved with zero interest rates. Nonetheless, monetary authorities are not yet impressed. No monetary authority has so far come forward to adopt the optimal monetary policy rule. However, all economists, when analyzing the zero-bound interest rates, they neglect the undeniable fact that both inflation and deflation have similar inefficiency effects. This means that any policy that sets inflation or deflation targets, no matter how small. Is still inefficient. The Friedman's optimal rule is therefor hardly optimal.

WOULD ISLAMIC FINANCE TREAT BOTH INEFFICIENCIES?

The availability of money through the classical loan contract, i.e., the purchase of spot money for future money at a premium, causes both types of inefficiency. Friedman-Samuelson inefficiency is assured because of the positive interest rate. Hosios inefficiency exists too because the process of finance does not interfere with asymmetric matches.

The shift to Islamic finance would have to involve few institutional changes (Al-Jarhi, 1981).

First, banks would give up the use of the classical loan contract in favor of 20 or investment and finance contracts that can be grouped into four categories of equity, profit and product sharing, agency investment, and sale finance. Second, all money issued by the central bank would be placed in investment accounts with banks, called central deposits or CD's while total reserves are observed. Third, the central bank issues central deposit certificates, CDC's whose proceeds would be placed in CD's. The central bank would conduct monetary policy through changing the money supply by adding or withdrawing from CD's. Fine tuning would be done through open market operations in CDC's. the rate of return on CDC's, or RCDC, would become a good indicator of the real rate of growth.

The optimal monetary policy rule would become to equate the rate of monetary expansion with the rate of growth, which is calculated from RCDC[4]. Absolute price stability, instead of target inflation or deflation, would be the natural result of such policy.

Instead of an administratively determined rate of interest on loans whose principal and interest are guaranteed by the virtue of the classical loan contract, the RCDC is paid on Mudaraba deposits whose principle and return are not guaranteed. People would allocate their savings between different investment outlets, based on comparing RCDC with the rates of return on other investments. The incentive to economize on real balances in transactions would be eliminated, as there would be no incentive in a growing economy to add monetary balances to investment deposits for the sake of earning an uncertain rate of profit, coupled with the possibility of loss. The Friedman Samuelson would consequently disappear.

The availability of finance through the 20 Islamic financial contracts, i.e., through profit and product partnership, investment agency and sale finance can have positive effects on the process of trading.

Traders, knowing that banks are good sources of information regarding prices and trading partners, the would not take time out of their productive activities to search. Even if they have sufficient liquidity, when saving in the search cost is considered, prices for deferred payment net of search cost would favor obtaining finance from banks than liquidating their own "invested resources." To finance their purchases. This leads to division of labor in the search activities, where banks specialize and become more efficient

[4] The rate of return on aggregate investment would be equal to a weighted average of the rates of return on all investments in the economy, where weights are the value of resources invested in each. The RCDC would be equal to the average profitability of aggregate investment or the real rate of growth minus the Mudareb fee charged by banks investing CDC proceeds and the central bank fee in lieu of its intermediation between CDC holders and banks.

in information collection and dissemination. While individual traders find themselves at a comparative disadvantage in information search, they cannot sell any surplus information they might collect to other traders. Their information-collection activities become rather unproductive.

Banks meanwhile, expecting that traders, both buyers and sellers will refer to them as sources of trading information, they accumulate a portfolio of trading information through systematic and professional search they would bargain with suppliers on attractive prices that would provide buyers what they consider good deals and afford them comfortable profit margins. The information collected by banks in their search activities would be directly translated into improvement in matching possibilities of each trader and internalized through better prices for both buyers and sellers and better profit margins for banks.

In brief, by providing sale finance, banks play a catalytic role in matching buyers and sellers and distributing the externalities of improving match opportunities to trade partners as well as banks themselves, so that such externalities can be completely internalized. The improvement in the efficiency in the search activities due the division of labor, and the resulting incentives provided to traders, would expand rather restrict the volume of transactions in commodities.

On the investment side, banks in an Islamic economic system specialize in investment activities. Their specialization enables them to better handle the lemon problem through feasibility studies, financial analyses, and governance. Their expertise in investment evaluation makes them more capable to conduct due diligence. Their participation in business management boards, on their own behalf or on as agents to their customers, would protect their investments from risks associated with information asymmetry. This would further enable them to provide their investment partners with larger volumes of finance through Mudaraba, Salam and Wakala, which can be subject to information asymmetry.

In other words, banks undertaking of equity finance, would enable them to provide more finance as partnership in product and profit, in addition to Mudaraba, Wakala and Salam. The participation of banks in capital subscription provides a signal to other investors that a sufficient amount of due diligence has been done to avoid the lemon problem. This would be instrumental in attracting other equity investors to the same venture. The same applies to Mudaraba, Salam and Wakala finance.

CONCLUSIONS

The introduction of search costs into the macroeconomic model exposes two inefficiencies that have not generally been made apparent to mainstream economists, because the construction of search models has been a nascent phenomenon. In the first type of inefficiency, search activities would not be uniform among traders. Those who do more searching would be unable to internalize their extra information by selling it to others. Such gains from search would become a deadweight loss. Lack of internalization leads traders to limit their search activities which would lead to keeping the volume of transactions below optimum. This is termed the Hosios inefficiency.

The existence of a positive rate of interest in a search economy, would entice economic agents to economize on cash balances and carry out a volume of transactions that is less than optimal. In addition, they would attempt to substitute real resources for money in transactions, thereby reducing total output and lowering efficiency. This is termed the Samuelson-Friedman inefficiency.

Switching form an interest-based finance to Islamic finance would serve two purposes at the same time. First, money would have no positive guaranteed rate of return, and consequently, traders have no incentive to economize on money in transactions. The volume of real balances used in transactions would reach its optimum. Second, all search externalities related to significant trading deals would be internalized to trading partners through banks providing Islamic finance, through both sale and partnership finance. On both counts, Islamic finance is a winner.

The limitation of this theory is obvious. The ability of Islamic finance to correct for both types of inefficiencies will be extremely weakened with Islamic banks mimicking conventional banks. In such case, the Islamic finance contracts would be shunned and replaced by camouflage contracts, which does not involve real trading or real investment. A great deal of added value would therefore be lost by Islamic finance.

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